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THE

VACCINATOR'S HELP.

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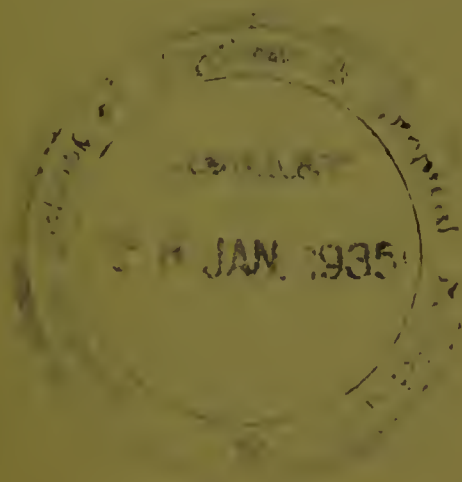
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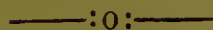
1894.

PREFACE.

The object of the following pages is to give the vaccinator an intelligent grasp of what he ought to know and to put the facts concerning vaccination in as clear a light as possible so that he may not lend himself to statements which have a false foundation.



VACCINATION.



Small-pox being the disease against which the vaccinator's efforts are directed it will be well to consider briefly some of its chief features. Small-pox is a disease which attacks all classes of people but seems to act most severely on dark-skinned races and particularly negroes. Children are its most common victims. The disease is marked by several distinct stages, namely.

1. STAGE OF INCUBATION. For 11 or 12 days after exposure to Small-pox there is a risk of the person, so exposed, contracting the disease unless he has been protected by a former attack, by vaccination, or by revaccination. This period during which no symptoms shew up, when the disease is quietly developing in the person's system is termed "the stage of incubation."

2. STAGE OF INVASION. For two or three days after this the person has headache, shiverings, pain in the back and legs, sickness or vomiting, high temperature and occasionally

convulsions. This is termed "the stage of invasion."

3. ERUPTIVE STAGE. The rash begins to appear on the face, then the neck and trunk and finally on the legs and arms. The mouth, nose, eyes, and throat become affected and cough is a marked symptom. This stage lasts four or five days and the rash assumes the form of clear small vesicles with a depression in their centres. During this stage the fever becomes less. This stage has been called "the stage of the rash or the eruptive stage."

4. STAGE OF MATURATION. The vesicles now begin to undergo a change. Instead of remaining clear they become turbid and opaque and a red ring forms round them. This change is accompanied by another rise in the temperature called the "secondary fever." This stage is termed the period of maturation or ripening of the pocks.

5. STAGE OF DESSICATION. The fifth and last stage is the formation of scabs which gradually fall off leaving scars. During this stage the fever abates. This is termed "the stage of dessication" meaning thereby the drying up of the pocks.

Small-pox assumes different degrees of severity being sometimes very mild and ending in recovery but very often severe and ending in death from high fever, affections of the chest or other complications. It often causes permanent and total loss of sight and hearing. Note carefully that a mild case in one person may give rise to a very malignant form in another person.

There is another disease, viz, chicken-pox which might be mistaken for small-pox and it is just as well to say a few words about it also.

CHICKEN-POX is a disease which occurs chiefly amongst children. It is attended with a rash resembling that of small-pox. It is contagious and sometimes assumes the nature of an epidemic. The period of incubation may be 10 days, longer, or shorter. Sometimes the rash appears without anything having occurred to attract attention. There may be, however, slight fever for a few hours, but as a rule not longer than 24 hours before the rash is visible. The fever is never so severe as in small-pox. The rash comes out in crops of two or three vesicles at different times so that some may still be quite clear and translucent while others have already

turned turbid from the formation of pus. The vesicles are about the size of a split-pea or smaller. The disease reaches its height in from 7 to 10 days and is all over within a fortnight. Death seldom occurs from it.

With these few remarks on small-pox and chicken-pox we shall proceed to consider vaccination and some of the points to be attended to in performing the operation, &c.

VACCINATION means inoculation with lymph that is the introduction of lymph into the system as a means of protection against small-pox. It has been called "the new inoculation" in order to distinguish it from a practice which prevailed from very early times and still prevails in some parts of India called "inoculation" or "country vaccination" by which the poison of small-pox is introduced into the system of healthy persons with a view to preventing small-pox or lessening the severity of an attack. This effect has sometimes been obtained but it must also be distinctly understood that the practice is liable to spread the disease to an alarming extent and that very often small-pox contracted in this way has proved fatal. Hence it is that laws have been enacted to prevent it and the practice is now

regarded in many countries as a most serious crime.

Inoculation was introduced into England early in the 18th century from Constantinople, the capital of Turkey, and was in vogue till near the close of the same century when the immortal Jenner discovered "the new inoculation" now better known as "vaccination."

It became known that the cow was sometimes attacked with a disease called "Cow-pox" and that those who milked such cows and had cow-pox curiously enough did not contract small-pox and it is on record that an English farmer named Benjamin Jesty intentionally inoculated his wife and two sons from a cow suffering from the disease as a protection against small-pox. A similar belief is said to have existed in Germany about the same time and it is said that a school-master vaccinated two children with the same object in view. Dr. Jenner took up the question and in the face of much ridicule worked at it till he established its truth and in 1798 he published the results of his experiments. One writer has said, "In the last century the resulting mortality in some of the countries of Europe was often equal to the entire population of one

of their largest cities. If a modern traveller could find himself transported to the streets of the city of London as they appeared in the earlier part of the present century, it is probable that no peculiarities of architecture, dress, or behaviour would be to him so strikingly conspicuous as the enormous number of pock-marked visages he would encounter among the people at every turn."

Since vaccination was introduced matters have assumed an entirely different aspect. A pitted face is now-a-days almost one of the rarest object to be seen in the British Isles.

Unfortunately the same cannot be said of India.

Thousands of men, women and children have been blemished for life though ignorance and prejudice and thousands still obstinately refuse the gift of one of the greatest blessings that science has ever offered them and most strenuously oppose what is calculated to be for their greatest good. This state of matters is to be very much regretted but until they fully realise the importance of vaccination it is the duty of every educated and intelligent person who has the interests of vaccination at heart to endeavour

to convince them of its real value by every possible argument in its favor. I have already mentioned that one object of this paper is to guard the vaccinator against making false assertions by putting before him, only facts, concerning vaccination and he will find in facts a stronger argument in favor of vaccination than ten thousand defenceless statements. Vaccination then does not always protect against small-pox nor indeed does one attack of small-pox protect against a second attack. Every vaccinator should have those two facts thoroughly before him. If, however, vaccination has been successfully performed the chances are that for a number of years at any rate the vaccinated person is, (in the great majority of instances) proof against small-pox. Four good marks may be taken as sufficient to protect for a period of 5 or 6 years, in some cases longer, and in others for a whole life-time. The vaccinator who gives a child four good pocks gives greater security to that child than if he had given two and still greater than if he had given it only one. The vaccinator on the other hand who vaccinates unsuccessfully has done more harm than good because the ignorant class of people do not know when vaccination is successful and believe

it sufficient if the child's arm is only scratched, afterwards turns red and forms a scab, and are very much disappointed if after all their child should get small-pox. This is one way whereby the confidence of the people is lost and vaccination brought into disrepute by unskilful and careless vaccinators.

The following are the statistics of 20 years of one of the London small-pox Hospitals which bear out the truth of the above statements:—

PATIENTS ADMITTED WITH SMALL-POX.

	Number admitted.	Death rate per cent.
1. Having one scar.	2001	7.73.
2. „ two scars.	1446	4.70.
3. „ three „	518	1.95.
4. „ four „	544	0.55.
5. Said to have been Vaccinated but having no scars	370	23.57.

The practice in small-pox hospitals in England is to revaccinate all nurses and attendants. One writer says regarding an epidemic in 1876-77, “All revaccinated attendants have escaped whilst the only one who had not been revaccinated took small-pox and died of it.” Out of 1500 such

attendants 43 contracted small-pox and not one of these 43 had been revaccinated.

THE FOLLOWING IS THE RESULT OF A PERSONAL INVESTIGATION OF AN OUTBREAK OF SMALL-POX IN PIPLI DURING 1893.

HOUSE.	NO. OF INMATES.	AGE.	PROTECTION OR OTHERWISE.	REMARKS.
1ST.	6	From 3 to 12 years.	The two eldest were vaccinated in infancy. The four youngest had not been vaccinated.	All 6 had small-pox. The two eldest mildly and the four youngest severely.
2ND.	1 girl 1 girl 1 boy	10 years 4 " 11 "	4 good scars unvaccinated 4 good scars	Escaped Bad attack Escaped
3RD.	2 children. One boy One Girl	5 and 7 years respectively Eldest of family.	Both unvaccinated. One bad mark 2 good marks.	Both attacked. Both escaped.
4TH.	Adult male.	26 years.	Unvaccinated.	Attacked. badly.

HOUSE.	NO. OF INMATES.	AGE.	PROTECTION OR OTHERWISE.	REMARKS.
5TH.	Boy.	12 years.	Unvaccinated.	Bad attack
6TH.	Three children.	Not noted.	All unvaccinated.	All badly attacked.
7TH.	Boy.	14 years.	Unsuccessfully vaccinated.	Attacked.
8TH.	Boy.	9 years.	Unvaccinated.	Attacked.
9TH.	Boy.	Not noted.	Unvaccinated.	Badly pitted
10TH.	Boy.	7 years.	Unvaccinated.	Attacked.
	Girl.	9 years.	Unvaccinated.	Attacked.
11TH.	Child.	7 months.	Unvaccinated.	Bad attack
	Boy.	4 years.	4 good marks.	Escaped.
	Boy.	2 years.	2 „ marks.	Escaped.

The following statement is an extract from a report on an outbreak of small-pox in Glasgow and shews the effect of vaccination on the rash and also on the death rate:—

I. EFFECT ON RASH.

(a) *Unvaccinated.*

Scanty rash in 13 per cent.

Copious rash in 41 „

Confluent rash in 41 „

(b) *Vaccinated.*

Scanty rash in 59 per cent.

Copious rash in 29 „

Confluent rash in 12 „

II. EFFECT ON MORTALITY.

Of 623 cases vaccinated 8 per cent died.

„ 266 „ unvaccinated 31 „

Patients with good marks 3·8 „

Patients with bad marks 21 „

Patients with no marks 30 „

In Prussia vaccination was compulsory only in the army from 1834. In the year 1874 however, an Act was passed ordering compulsory

Note.—By a confluent rash is meant that the pocks are so numerous and so close together that no portion of the skin escapes and such cases I may add are exceedingly dangerous and fatal.

vaccination of every child at the age of 12 years. The statistics are interesting. They are taken from Dr. Edwardes's book, page 36.

“PRUSSIA. *Before and after the vaccination law of 1874* :—

The deaths from small-pox per 1000 living each year for the period 1816-82 were :—

1816-30.....45, 27, 29, 20, 10, 17, 20, 19, 14,
15, 14, 25, 19, 19, 24.

1831-50.....11, 30, 60, 48, 27, 18, 15, 16, 14,
16, 14, 22, 28, 27, 15, 15, 9, 13,
10, 15.

1851-70.....12, 18, 39, 43, 9, 7, 13, 26, 19, 18,
30, 21, 33, 46, 43, 62, 43, 18,
19, 17.

1871-72.....243, 246 (the great epidemic.)

1873-74.....35, 9.

1874 (Revaccination of general population in
school age made compulsory.)

1875-82.....3·6, 3·1, 0·3, 0·7, 1·2, 2·9, 3·6, 3·6,

1884-86.....4·00, 1·5, 1·4, 0·5.”

Thus it will be seen that revaccination at the age of puberty practically has the effect of abolishing small-pox.” *Extract from the report of Dr. Dyson, Officiating Sanitary Commissioner for*

Bengal on the working of the Vaccination department in Bengal during the three years 1890-91, 1891-92, and 1892-93.)

The following suggestions should be carefully observed by the vaccinator:—

1. As a rule give four good pocks.
2. Endeavour to operate successfully.
3. Do not lead the people to understand that primary vaccination confers proof against small pox for a whole life-time even although you know it does sometimes.
4. Revaccinate every six or seven years. A person should never pass the time of puberty without revaccination. In Germany every soldier is compelled to be revaccinated on entering the army.
5. Revaccinate during epidemics of small-pox without regard to the length of time that has elapsed since primary vaccination.
6. Vaccinate every child, even the newly born, if small-pox is prevailing in the village. The younger the child the greater its chance of taking the disease.
7. Every child should be vaccinated before it

is five months old whether small-pox is epidemic or not.

8. If you suspect for any reason whatever that a child is about to develop small-pox vaccinate that child at once. By doing so you may avert the disease or convert what might otherwise have been a bad attack into a comparatively mild one. It is well known that vaccination will overtake and destroy the small-pox infection even when the small-pox infection has had two or three days start. Be sure, however, to point out to the persons concerned that you are only trying to check the disease or they are sure to blame you if after all small-pox should appear even in a mild degree.
9. If small-pox breaks out in a house go at once and vaccinate all the other members of the family.

By this simple precaution I have known six members of a family to escape the disease.

Enough has been said under this heading and I shall now consider the selection of the lymph.

It has been already mentioned that cows suffer from a disease called "cow-pox." This disease

resembles small-pox in the human subject in so far as it passes through similar stages. There are, however, few if any of the grave symptoms which attend human small-pox. The disease in the cow can only produce pocks when the lymph is applied directly whereas it is well known that small-pox may be contracted at a great distance through the air or infected articles of clothing, etc. It is to cow-pox as has already been stated that we are indebted for lymph suitable for human purposes. This lymph is of two kinds, viz., "bovine" or the so-called "calf-lymph" and humanised lymph.

Calf lymph is the virus of cow-pox which has passed through a successive series of calves becoming thus more fit for human use.

Humanised lymph is that which is taken from a human being as in arm-to-arm vaccination. The original supply, however, was calf-lymph the supply having been kept up in the human subject instead of the calf. This constitutes the difference between the two.

The kinds of animal lymph with which the vaccinator should be acquainted may be conveniently classified as follows :—

1. Lymph derived directly from an original case of cow-pox.
2. Lymph derived from a cow inoculated with human-pox virus.
3. Lymph derived from horse-pox in a disease of the horse known as "grease."
4. Lymph derived from a cow which has been inoculated with lymph from a human being.
5. Calf lymph to which we have just referred.

The first may be passed over without consideration as it is rarely to be had and moreover is said to be too severe in its action when used.

The second should never be used under any circumstances.

The third has no particular merits to recommend it and nothing has yet been proved as to its protective qualities.

The fourth is very seldom used. It was, however, formerly resorted to with a view to securing lymph free from any constitutional taint and because the process of passing it through a cow's system was and is still believed to endow it with more powerful properties.

We are thus reduced to the fifth and last, *viz.*

calf-lymph, and above all others this is the lymph which has most to recommend it and which it is most desirable to use for vaccination purposes. It has been clearly demonstrated by most competent observers that calf-lymph confers on the person vaccinated therewith more lasting protection against small-pox than human lymph does as is proved by the fact that the revaccination of those persons vaccinated originally with cow-lymph is most difficult whereas the revaccination of those originally vaccinated with human lymph is more easily effected. It may be put down as a fact, however, that "animal lymph acts more severely on revaccinated adults than human lymph does but that infants suffer less when vaccinated with animal lymph."

The advantages of calf-lymph may be enumerated as follows:—

1. It gives a more lasting protection than human lymph.
2. It cannot communicate human constitutional diseases.
3. The supply can be easily kept up.
4. The vaccinifer, (by this the calf is meant,) may be conveyed from village to village.

You cannot use the same freedom with human vaccinifers.

5. With a sufficient number of calves the necessity for storing lymph in tubes or otherwise preserving it is avoided.

We shall now deal with the material used for vaccination, bearing in mind that nothing else should be used if calf lymph is available for our purpose.

1. Crusts are only mentioned to be condemned. One writer states that he has made successful use of crusts seven years old that had made the voyage from America to Japan and back; and they were bovine crusts too. The same writer says, "I have happened to open a crust that to all appearance was typical and innocent and to find in its interior a cavity occupied by a pulpy, stinking slough."

I would say to every vaccinator, "never use crusts for by their use you run the risk of causing serious complications and acquiring a bad name amongst the people."

2. Tube-lymph is objectionable. Neither human nor animal lymph keeps well in tubes.

Decomposition takes place in spite of the greatest care in sealing them, and more particularly is this the case in India.

3. Dried lymph has been used successfully after several years but is now-a-days rarely, if ever, used.

4. Lanoline lymph or lymph preserved in lanoline has of recent years been introduced into India and from careful experiments conducted in the Animal Vaccination Dépôt at Darjeeling has been found to be a most successful method of storage and preservation, and when carefully used proves most successful in vaccination operations.

5. Vaccination direct from the calf. This of all other methods is the one most suitable from every point of view and which the Government of Bengal are most anxious to introduce. The system of vaccination direct from the calf is to be worked in the following manner as described by Dr. Dyson in his report on the working of the Vaccination department in Bengal during the three years 1890-91, 1891-92, 1892-93:—

“A calf is to be procured through the village headman (as a rule for nothing, though eight annas to one rupee per calf may sometimes have

to be paid) and is inoculated with lanoline lymph obtained from one of the depôts, on its abdomen, which must of course be first washed with soap and water and then shaved by the vaccinator. From this calf all the village children are vaccinated as well as a calf from each of the neighbouring villages which are brought in for the purpose and returned to their owners immediately after inoculation. When the lymph is ripe on these calves which is usually on the sixth day after inoculation the vaccinators proceed to the village and vaccinate from the calves all the children of those villages as well as fresh calves from other villages. In this way animal vaccination is spread throughout the district and the evils of arm-to-arm vaccination are avoided. No harm is done to the calf which requires no particular care during the period the lymph is ripening on it."

Vaccination is very backward in Bengal and in no other province have vaccinators done such an average small number of operations each. In the North-West Provinces and Oudh the Punjab, Central Provinces, Berar, Burmah Assam, Madras, and Bombay Presidencies Mysore and Coorg Provinces each vaccinator performed during 1891-92 on an average 1770

operations whereas in Bengal they only performed 625 each. The primary vaccinations in Bengal shew, however, a much better percentage of successful operations than any of them or 99·43 as compared with the Central Provinces which shews 96·40 as the next to Bengal and the lowest is Burmah with only 85·21 per cent of successful operations. In Bengal each successful operation cost on an average during three years one anna and nine pies and the same in the Punjab. In Assam each successful operation cost only one anna six and three quarter pies which is the lowest of all. The cost was greater in all the other Provinces being over five annas in lower Burmah and Coorg, and over three in upper Burmah and Madras. From two points of view therefore, *viz.*, economy and success in operations it would appear that Bengal holds a very favorable position but it must be understood that in Bengal out of 3039 vaccinators 1756 received fees from the people while 878 others were unpaid apprentices who performed operations but cost nothing to the state. As far as figures are concerned I would not like to put too great faith in them for many vaccinators I am afraid have still to learn the importance of speaking the truth, the whole truth and

nothing but the truth. It serves no useful purpose to resort to falsehood and the vaccinator who resorts to it whenever it suits his purpose best will sooner or later come to grief. Such a man is a danger to the community in which he lives and should be shunned by every honest and straightforward person. Successful operations will sooner or later shew themselves in the decreased death rate from small-pox. No matter how many of the population have been protected by small-pox children continue to be born everywhere liable to contract the disease and die unless protected by vaccination. There is always material to work upon and it is the duty of every vaccinator to put forth his best and most conscientious endeavour to have every man, woman, and child in his *ilaka* well vaccinated. In no part of India perhaps has vaccination made so little head-way as in Orissa and nowhere are so few children under one year of age protected and in no part of India are more deaths recorded from small-pox.

In Bengal in 1892 there were 3844 deaths from small-pox amongst children under one year of age, or 17·18 per cent of all the deaths from small-pox during that year.

In the same year there were 6,973 deaths amongst children from one to six years, or 31.18 per cent of all the deaths from small-pox, and 3937 amongst children from six to twelve years, or 17.60 per cent of all the deaths from small-pox.

The total number of deaths at all ages from small-pox during the year 1892 was 22,359. Therefore 15,000 children under twelve years of age died from small-pox whose lives might have been saved if they had been properly protected against that disease by vaccination.

Dr. Greig, the Sanitary Commissioner for Bengal, remarks, "It will be seen that the districts which suffered most were Puri, Cuttack, Lohardaga, Midnapore, and Palamau in the order named. In all the other districts the mortality was less. In other words the prevalence of small-pox to any serious extent was practically limited to Orissa, Chota Nagpore, and Midnapore where vaccination has not made much progress owing to the strong prejudices of the people."

For the purpose of shewing the value of vaccination I have made use of two tables from the Sanitary Commissioner's report on vaccina-

tion for the three years 1890-91, 1891-92, 1892-93.

In Darjeeling 7,357 children under a year were available for vaccination. The number successfully vaccinated was 4,008.

In Puri 29,691 children under one year were available for vaccination. The number successfully vaccinated was 185.

During the year 1892-93 Darjeeling returned 18 deaths from small-pox, or $\cdot 08$ per 1000 of the population.

During the same year Puri returned 2,221 deaths from small-pox, or $2\cdot 42$ per 1000 of the population.

In 1887-88 Sheffield in England suffered from an epidemic of small-pox. The following statement shews what happened:—

CHILDREN UNDER 10 YEARS OF AGE.

	Attack rate per 1000.	Death rate per 1000.
Vaccinated	5	$\cdot 09$.
Unvaccinated	101	44.

PERSONS OVER 10 YEARS OF AGE.

	Attack rate per 1000.	Death rate per 1000.
Vaccinated twice	3.	·08.
Vaccinated once	19.	1.
Unvaccinated	94.	51.

These figures shew what holds good both in Sheffield in England and Puri District in India that where the greatest opposition to vaccination exists there exists also the largest death rate from small-pox.

We shall now proceed to discuss VACCINATION AND ITS COMPLICATIONS. As a rule the complications are of a trifling nature partaking of some form or other of simple inflammation of the skin which soon passes off. In very many cases such complications are the result of some inherent weakness in the child's constitution which is most apt to shew up at the age when vaccination should be performed, viz., shortly before the teething process begins. Very often the cause is carelessness or negligence on the part of the parent of the child which has been vaccinated or the dirty and unhealthy conditions under which the child

lives. People are only too ready to point the finger at vaccination and ascribe to it all such complications and for that reason the operator should be on his guard. The vaccinator should wisely refrain from vaccinating those children with diseased skins except perhaps it is only a case of itch.

If he withholds vaccination from children suffering from scabies, in Orissa at least, I am afraid his operations will be exceedingly scanty. During epidemics of small-pox, however, he should vaccinate them whether they have skin disease or not. Of two evils always prefer the lesser.

“It is reported on trustworthy authority that an American doctor had engaged to vaccinate a child on a certain day but for some reason or other the vaccination was not done. In about a week from the appointed day, however, erysipelas made its appearance, beginning on the left arm at the usual site of vaccination and pursued its course to a fatal termination.”

This, so far as the doctor was concerned, was a most fortunate escape although it is regretted that the child died. If the vaccination had been performed on the appointed day the

unfortunate result would have been most assuredly attributed to the vaccination.

The possibility of communicating disease through vaccination has been largely discussed by the most competent authorities and nowhere more carefully than in France. For a long time the theory prevailed that disease could not be produced by vaccination provided the lymph used was free from blood and where the precaution to remove lymph only from the arm of a child was taken there was no danger whatever. Some most distinguished writers still hold this opinion. On the other hand some say that all lymph contains more or less blood no matter how carefully it is abstracted from the arm and although it may not be visible to the naked eye. There are only two ways whereby the danger may be averted, namely, by either removing lymph from the arm of a healthy child or by using calf lymph only.

In order to be able to carry out the first injunction, it is important that the vaccinator should be acquainted with some of the signs which are present in some unhealthy children, and he should make a careful study of them whenever he has an opportunity for doing so. The signs may be enumerated as follows:—

1. Enlargement of the glands of the neck and other parts of the body.

2. Snuffling owing to disease of the nose, or an unusually flat nose.

3. Sores of the mouth located chiefly at the angles.

4. Sores of a brownish yellow colour like copper.

5. A reddish scaby rash usually appearing on the buttocks, privates, belly, thighs, face, feet and hands is a danger signal.

6. Unusually small and notched front teeth.

7. If the eyes lose their glistening appearance and turn dull or become so inflamed and painful that the child cannot bear the light and so keeps them shut.

8. Running ears.

The vaccinator should remove lymph from the arms of those children only who are perfectly free from all such unhealthy signs. Diseases following vaccination are of rare occurrence and when they do happen must be put down to ignorance and carelessness. There is no excuse for Indian vaccinators. An Indian child can be examined from head to foot without

the slightest difficulty and never should a child be selected for a supply of lymph until this has been done most thoroughly. The use of calf lymph will entirely remove all risk. Whether he uses human or calf lymph, however, I would strongly impress upon the vaccinator the great importance of keeping his lancet spotlessly clean. After every operation he should carefully wipe and disinfect it either by dipping it into boiling water, which can be easily had in every village, or into some strong disinfecting material. Carelessly piercing the arm of child after child collected for vaccination without this precaution is to be condemned and the vaccinator who shews such an amount of gross carelessness and recklessness should divert his attention to some other occupation.

THE OPERATION, AND HOW IT SHOULD BE PERFORMED. In order to perform this operation it is essential that the vaccinator should have his lancet clean and sharp. The arm of the child to be vaccinated should be carefully washed. The vaccinifer should be a healthy child. Healthy vesicles should be selected and lymph should never be taken from a pock older than eight days or which shews signs of the formation of pus and scabs. The pock selected should be well

punctured with the point of the lancet but care should be taken not to draw blood and upon no consideration should a pock be squeezed. By squeezing it you get blood not lymph and you run the chance, moreover, of causing a sore arm to the child who is so graciously supplying you with material for your work. The left arm is usually selected but this is only a matter of choice or convenience as any part of the body would do equally well. The mode of application of the lymph is important and calls for special consideration and attention. The easiest and simplest method is to introduce the point of the lancet charged with lymph into the skin and only sufficiently deep to avoid bleeding. The point of the instrument should be directed towards the elbow of the child you wish to vaccinate so that the small flap which is made will retain the lymph when the arm falls to the side again.

There is another method in which the skin is merely scratched in straight and parallel irregular lines. The scarifier and such like instruments have been devised as a rapid method of doing this but are only useful in skillful hands and are perhaps objectionable on the

ground that they are not so easily kept clean as the ordinary lancet and, moreover, that their points do not act evenly on the skin which thus necessitates repeated scratching. A third method, or the gentle scraping off of the superficial layer of the skin is in good repute and causes no pain whatever. It takes a little more time and requires a little more patience on the part of the operator.

Some operators have even blistered the skin before applying the lymph but this is neither necessary nor desirable.

DEVELOPMENT OF THE POCK. On the second or third day after vaccination a slight elevation can be felt with the finger and on close examination half a dozen or so of small vesicles may be seen, which gradually run together forming one single large vesicle which bulges round its edges and becomes depressed in its centre. At the same time a red ring is seen round the pock called the "areola." These constitute a typical vaccine vesicle. Note very carefully that if a red ring appears soon after the operation it may be put down to dirt, introduced on the point of your lancet, which has irritated the skin. At any rate it is an undesirable occurrence and

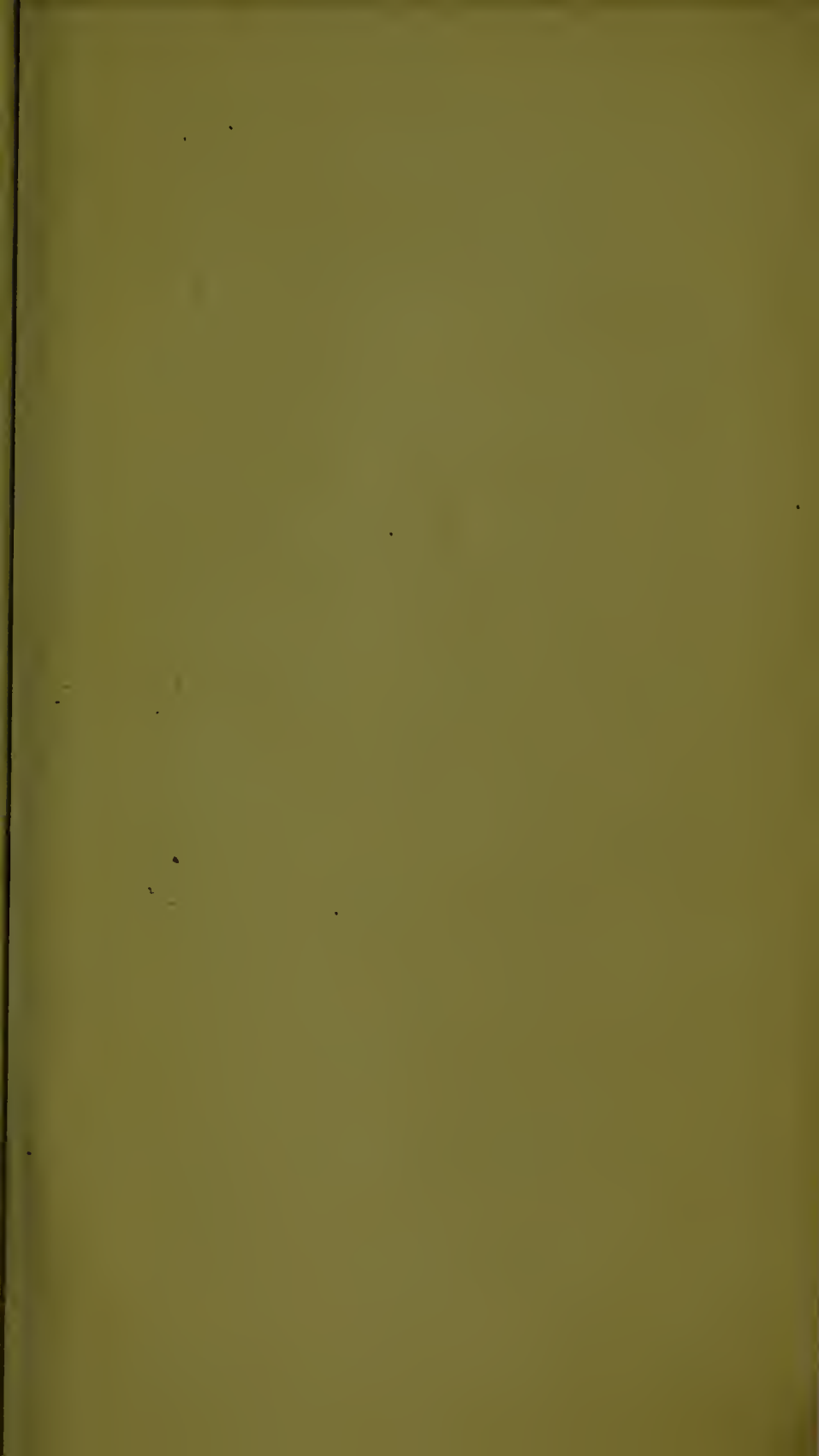
should not take place for some days after the vaccination has been performed. During the development of the pock there is usually slight fever, restlessness, and itching. Care should be taken that the pock is not injured and healing will take place all the more speedily. After the 8th day the contents of the vesicle begin to lose their clear and translucent appearance and turn turbid owing to the formation of pus inside. A crust begins to form near the centre of the pock and gradually spreads till the whole of it is converted into a scab which depending upon the care taken falls off from the 15th to the 35th day. When the crust falls off a reddish depressed scar is seen which gradually turns paler. This scar is the true characteristic of a successful vaccination and as a rule remains permanent. I cannot conclude my subject more aptly than by quoting the words of a distinguished writer who says regarding small-pox,

“The loftiest end to be reached is its complete removal from all civilised countries and indeed from the face of the earth by universal vaccination and revaccination. The day is not far distant when the man, woman, and child unprotected by vaccination will properly be

regarded as an enemy of the human race and treated accordingly. Evidence of the most satisfactory character as to successful vaccination should be imperatively required of all applicants for admission to schools, academies, colleges, charitable institutions, public libraries, art galleries, and places of labour legislatures, political, religious, and deliberative bodies; of every purchaser of a ticket for purpose of travel; and of every voter. In addition there should be in every district a systematic and periodical inspection of all persons registered in the census by persons qualified and competent to perform compulsory vaccination. This is the scientific treatment of small-pox."

THE END.





1875

JUN. 25